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How dry periods affect lifetime production

Subsequent lactation is important, but what happens to lifetime production when using shortened dry periods?

by Jana Hutchison, Melvin Kuhn, and H. Duane Norman

MUCH of the recent research on length of dry period has focused on how it affects milk yield in the subsequent lactation. But what about the additional milk obtained in the previous lactation by drying off the cow 10 or 20 days later? What dry period length will optimize the yield from the two surrounding lactations? How does a shorter or longer dry period affect lifetime production?

In a study recently accepted by the Journal of Dairy Science, we reported on the dry period lengths to maximize yield across adjacent lactations and lifetime yield. DHI records were used on approximately 460,000 first- and second-lactation Holsteins and 200,000 second- and third-lactation Holsteins from roughly 4,200 herds across the U.S.

While examining the subsequent lactation is important, studying two back-to-back contiguous lactations together is more useful to see if the milk lost in the future lactation due to a shortened dry period would be offset by the gain in the previous lactation.

Figure 1 shows the effect of days dry on the total yield across Lactations 1 and 2 (blue line) and across Lactations 2 and 3 (red line). The first important point is that production losses across Lactations 1 and 2, associated with dry periods less than 60 days, were considerably less than for Lactations 2 and 3.

For example, cows with a 10-day dry period between first and second lactations lost only half as much milk production as cows with a 10-day dry period between second and third lactations, when taking into consideration both the milk gained in the previous lactation and the milk lost in the subsequent lactation.

Milk loss for first and second lactations combined was small after a minimum of 40 days dry. In contrast, a dry period of at least 50 days is needed to maximize milk yield across Lactations 2 and 3.

Also noteworthy is the production loss in second and third lactations after 60 days dry, compared with virtually no loss and some gain for first and second lactations after 60 days. This difference appears to be because long days open are associated with long days dry, and the cows with long days dry also had longer first lactations.

Although second- and later-lactation cows produce more total

milk than first-calf heifers, the heifers actually have higher production in late lactation. Thus, first-calf heifers produce enough milk late in lactation to offset the production loss due to a long dry period, whereas older cows do not.

Thinking lifetime . . .

Finding the optimal dry period length for lifetime yield would provide more complete information than simply looking at the effects of days dry in the surrounding lactations.

Lifetime yield not only accounts for loss of production in the lactation preceding the dry period but also accounts for any detrimental or beneficial consequences of days dry on herd life. For instance, if short dry periods result in earlier culling or if short dry periods had a carryover effect beyond subsequent lactation, this would be reflected in lifetime production but not in subsequent lactation yield or the sum of yields during back-to-back lactations.

Our research shows you can maximize lifetime milk, fat, and protein production with a 40- to 60-day dry period between first and second lactation, and a 30- to 40-day dry period after second lactation. (See Figure 2.) Short dry periods (less than 20 days) result

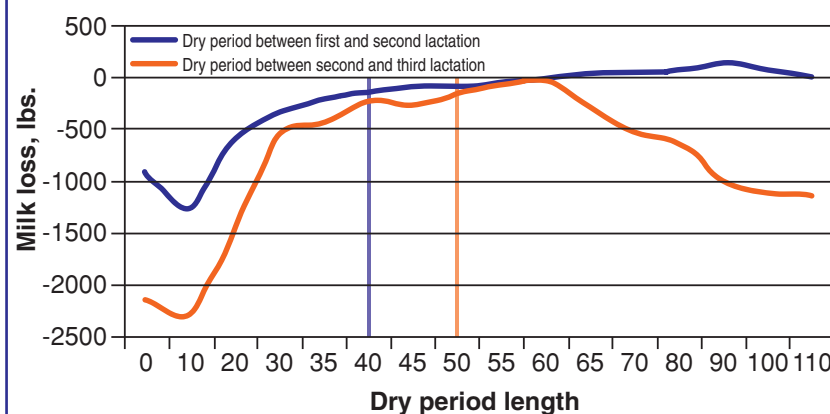
in too much loss in the subsequent lactation, and long dry periods (more than 60 days) result in too much loss in the previous lactation.

Why the contradiction in the optimum dry period for second and later lactations? For example, a dry period of 50 days provides highest milk yield across the second and third lactations. However, a 30- to 35-day dry period is best for lifetime milk production after the second lactation. The answer lies with lifetime days in milk. Although cows with dry periods of 50 to 60 days produce more total milk across second and third lactations, they also have fewer lifetime days in milk. And, consequently, they have lower lifetime yield.

The reason cows with shorter dry periods have more lifetime days in milk is because the shortened dry period causes lower milk yield which, in turn, leads to fewer days open (better fertility), and cows that breed back quicker stay in the herd longer.

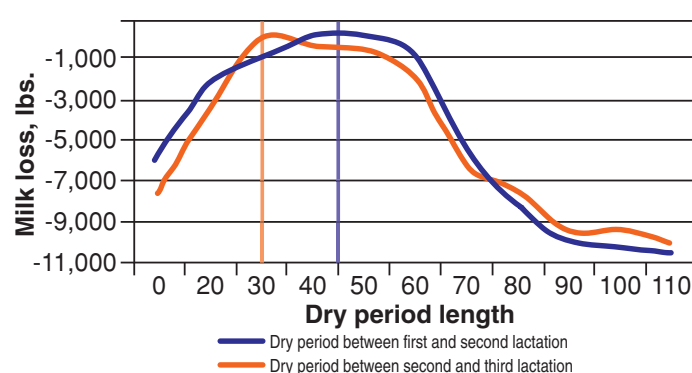
Therefore, the consequences of shortened dry periods (30 to 40 days) can be summed up as follows: short dry periods (30 to 40 days), lower milk in subsequent lactation, result in fewer days open in subsequent lactation, con-

Figure 1. Plan for at least 50 days for cows, 40 for heifers



A DRY PERIOD OF AT LEAST 50 DAYS IS NEEDED to maximize milk yield across Lactations 2 and 3 (note vertical orange line). Milk loss for first and second lactations combined was small after a minimum of 40 days (note vertical blue line).

Figure 2. What about the long term?



LIFETIME MILK PRODUCTION (in pounds) is greatest with 40 to 60 days dry between first and second lactation (blue), and 30 to 35 days dry after the second lactation (orange).

The authors are a dairy scientist and research geneticists at the Animal Improvement Programs Laboratory, USDA, Beltsville, Md.

tribute to longer productive life and higher lifetime yield.

While recent research has focused almost exclusively on the consequences of dry periods shorter than 60 days, one of the most pronounced results in the analysis of lifetime yield (Figure 2) is the amount of lost lifetime production associated with dry periods over 60 days. Cows with 90 or more days dry, for example, generally averaged over 8,800 pounds less lifetime milk yield than those with only 40 to 60 days dry. About 11 percent of all U.S. Holstein lactations have a dry period over 70 days and about 8 percent over 90 days. This implies substantial loss to U.S. dairy producers. Plus, this emphasizes the need for improved fertility since a primary cause of long dry periods is long days open.

The bottom line . . .

Determining an economically optimum dry period length is complicated by the fact that the only apparent "benefit" of shortened dry periods (better fertility, longer herd life) is brought about only because of the lower lactation yield following shortened dry periods.

It has been speculated that shortened dry periods would simplify management and feeding regimes and possibly reduce fresh cow health problems.

Considering then that there may be some benefit to shorter dry periods in some herds and that dry periods of 30 to 40 days after second lactation can be used without detriment to lifetime yield, probably the best recommendation to owners and managers is to first consider their own particular situation in regards to labor, parlor pressure, pen space, feeding regimes, and so forth. Then, if circumstances allow or favor shortened dry periods:

- Maintain 50 to 60 days dry for first-calf heifers because there is little benefit for dry periods after first lactation of less than 50 days.
- Providing 30 to 40 days dry after second and later lactations could be beneficial to lifetime performance and certainly can be done without detriment to lifetime yield.
- Avoid dry periods less than 30 days and longer than 70 days.

Dry period clarification

MILK production with no dry period was reduced 19 pounds per cow per day in the Wisconsin study reported on page 435 of the June 2006 issue. A 28-day dry period (versus 56) reduced daily milk by 9 pounds.



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Best regards,

Alexei Castro
Senior Product Manager

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Rick Sibbel, DVM
Director, Global Technical Services – Ruminant

This product has the potential for causing allergic reactions. See full product information summary for important prescribing information.

Wilson DJ et al. Comparison of seven antibiotic treatments with no treatment for bacteriological efficacy against bovine mastitis pathogens. *J Dairy Sci* 1999;82:1664-1670. Information and Resources: National Mastitis Council. Use these treatment procedures. <http://amconline.org/treatment.html> (March 2001).

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Amoxi-Mast® (amoxicillin)

LACTATING COW FORMULA (FÓRMULA PARA VACAS LACTANTES)

Intramammary Infusion (Infusión intramamaria)

CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

Amoxi-Mast (amoxicillin) is specially prepared for the treatment of bovine mastitis in lactating cows.

DESCRIPTION: Amoxi-Mast is a stable, nonirritating suspension of amoxicillin trihydrate containing the equivalent of 62.5 mg of amoxicillin per disposable syringe. Amoxi-Mast is manufactured by a nonsterilizing process.

Amoxicillin trihydrate is a semisynthetic penicillin derived from the penicillin nucleus, 6-amino-penicillanic acid. Chemically, it is D(-)-α-amino-p-hydroxybenzyl penicillin trihydrate.

ACTION: Amoxicillin is bactericidal in action against susceptible organisms. It is a broad-spectrum antibiotic which is effective against common infectious mastitis pathogens, namely *Streptococcus agalactiae* and penicillin-sensitive *Staphylococcus aureus*.

In vitro studies have demonstrated the susceptibility of the following strains of bacteria: α- and β-haemolytic streptococci, nonpenicillinase-producing staphylococci, and *Escherichia coli*. Susceptibility has not been demonstrated against penicillinase-producing bacteria, particularly resistant staphylococci. Most strains of *Pseudomonas*, *Klebsiella*, and *Enterobacter* are resistant. The clinical or subclinical significance of these *in vitro* studies is not known.

INDICATIONS: Amoxi-Mast is indicated in the treatment of subclinical infectious bovine mastitis in lactating cows due to *Streptococcus agalactiae* and penicillin-sensitive *Staphylococcus aureus*. Early detection and treatment of mastitis is advised.

WARNINGS: Milk taken from animals during treatment and for 60 hours (5 milkings) after the last treatment must not be used for food. Treated animals must not be slaughtered for food purposes within 12 days after the last treatment.

PRECAUTION: Because it is a derivative of 6-amino-penicillanic acid, Amoxi-Mast has the potential for producing allergic reactions. Such reactions are rare; however, should they occur, the subject should be treated with the usual agents (antihistamines, pressor amines).

DOSAGE AND ADMINISTRATION: Milk out udder completely. Wash udder and teats thoroughly with warm water containing a suitable dairy antiseptic. Dry thoroughly. Clean and disinfect the teat with alco-

hol swabs provided in the carton. Remove the syringe tip cover and insert the tip of the syringe into the teat orifice. Express the suspension into the quarter with gentle and continuous pressure. Withdraw the syringe and grasp the end of the teat firmly. Massage the medication up into the milk cistern.

For optimum response, the drug should be administered by intramammary infusion in each infected quarter as described above. Treatment should be repeated at 12-hour intervals for a total of 3 doses. At the next routine milking after the last dose, the treated quarter should be milked out and the milk discarded.

Each carton contains 12 alcohol swabs to facilitate proper cleaning and disinfecting of the teat orifice. **HOW SUPPLIED:** Amoxi-Mast is supplied in cartons of 12 single-dose syringes with 12 alcohol swabs. Each 10-mL, disposable syringe contains amoxicillin trihydrate equivalent to 62.5 mg of amoxicillin activity.

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